

Gas adsorption on carbon nanotubes

Aldo D. Migone, Southern Illinois University at Carbondale,
DMR-0089713

Gas adsorption on carbon nanotubes can be used to produce experimental realizations of matter in one dimension (1-D).

Our Ne adsorption isotherms, measured on bundles of as-produced HiPco nanotubes, provide evidence of the formation of a 1-D phase in the second layer of the film. This phase appears on the “groove” sites in the second layer. The grooves are the convex valleys formed on the external surface of a nanotube bundle by two contiguous tubes lying with their long axes parallel to each other.

Figure 1 shows a schematic drawing of a cut view of the outer tubes in a bundle. Ne adsorbed in the second layer groove sites is indicated in red, first layer Ne is in green, and the nanotubes are in blue.

The small sub-steps in the isotherms (marked by arrows in Fig. 2) correspond to this 1-D second-layer groove phase.

Fig. 1 Schematic of the second layer groove phase

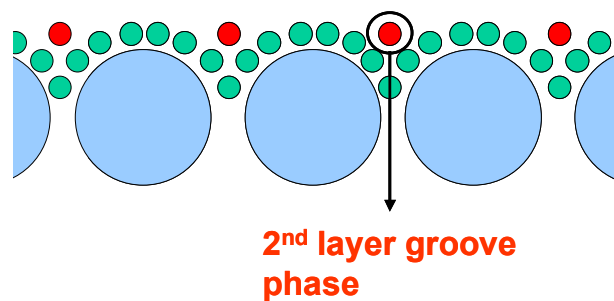
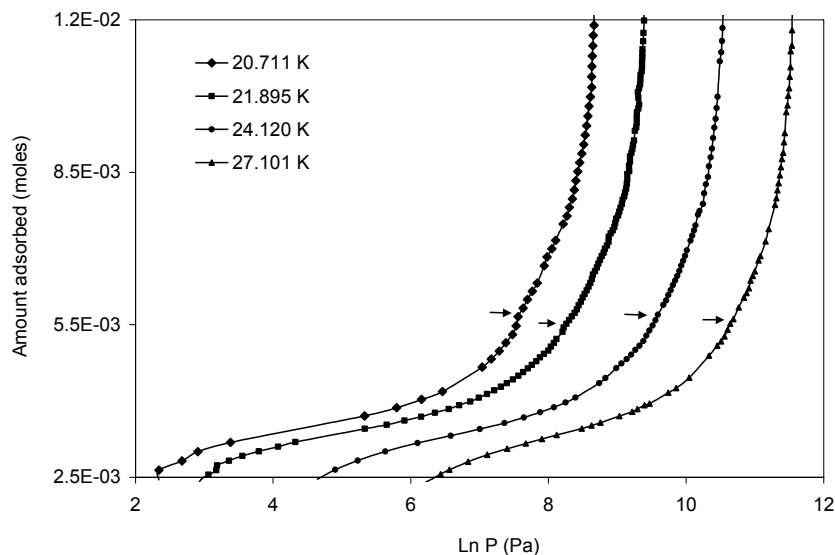


Fig.2 Ne adsorption isotherms on HiPco tubes

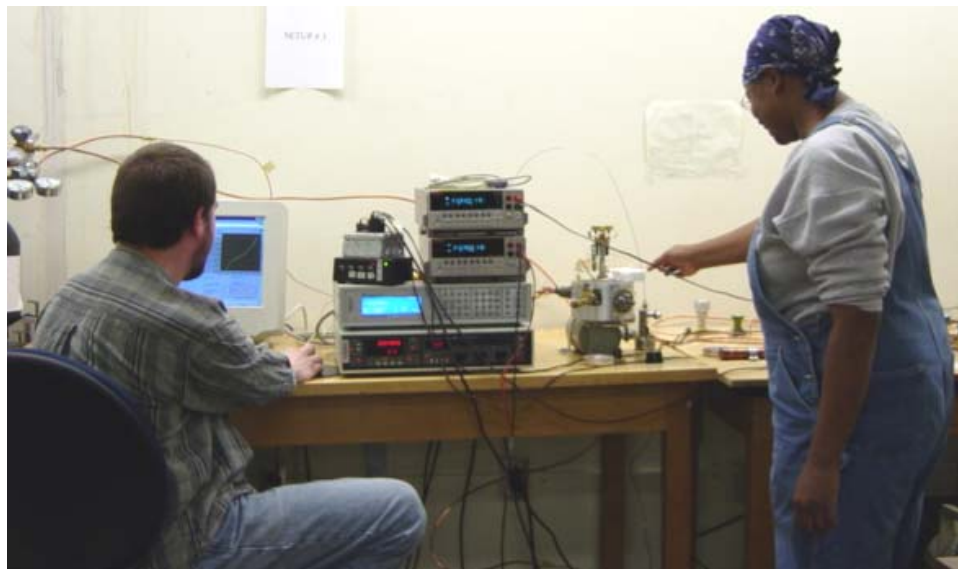


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Educational Aspects:

Currently, there are two undergraduates and two graduate students working on this project. The undergraduates, Ms. Naomi Taylor and Mr. Luke Heroux, have made a significant contribution to the research by developing a computer program, using LabView, to allow us greater flexibility in performing the adsorption isotherm measurements. Luke Heroux will start his Master degree studies in January, 2004 and Naomi Taylor will complete her Bachelor's degree in 2005.



Luke Heroux and Naomi Taylor working with the new adsorption setup that they built.

The two graduate students, Ms. Vaiva Krungleviciute and Mr. Dinesh Rawat, have recently obtained their M. S. degrees, and are continuing their doctoral research on gas adsorption on carbon nanotubes.